

A proposed system for stabilizing the names of species, illustrated with reference to the ICHNEUMONIDAE (Hymenoptera)

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Abstract. Based on information (original combinations, changes in generic combinations, homonymies, synonymies, changes in subspecific status and emendations) extracted from 3 836 references, the family ICHNEUMONIDAE had 31 709 described species and subspecies, of which 23 762 were considered valid taxa. In total, 61 001 names (binomina or trinomina) were correct under the terms of the *International Code of Zoological Nomenclature*. Of the 37 239 extra names, 26 702 were caused by differing generic combinations. As this is the major source of 'instability' in nomenclature, a proposal is put forward to amend the Code by preserving the original binomen (generic and specific (or subspecific) names) as the 'nomenclatural part' of the full scientific name, irrespective of taxonomic assignment. The taxonomic placement is indicated by placing the current generic name (and, when relevant, subgeneric and specific names) in front of the original binomen. Thus taxonomic changes will not impinge on the integrity of the nomenclatural binomen and the latter, which acts as a permanent and unambiguous identification label for the taxon, can be the key for storing and retrieving taxonomic and biological information either manually or by computer.

Introduction

The binominal system of taxonomic nomenclature was first proposed by Carl Linnaeus in 1745 and vol. 1 of the tenth edition of his *Systema Naturae* (1758) has been adopted as the origin of the current system of zoological nomenclature (see Usinger, 1964). The rules that govern the formation and application of zoological names are formalized in the *International Code of Zoological Nomenclature*, of which the current (third) edition was published in 1985.

The Code regulates the formation of specific names and the effects of changes in generic combination, homonymy, synonymy, emendation and changes in subspecific status. The literature pertaining to the family ICHNEUMONIDAE was studied to determine the effect of the current Code on the number of species-group names in this family. As a result, a proposal is put forward to amend the Code to make nomenclature more stable and more applicable to computer-oriented technology without diminishing the very important taxonomic function of the system.

The ICHNEUMONIDAE were used for this discussion because they are a large family, estimated to include more than 60 000 species (Townes, 1969), and a relatively homogeneous group, consisting of parasitic wasps that lay eggs in or on other insects. The larva develops at the expense of its host and kills the host in the process. This family includes many species of wasps that are important in the biological control of agricultural and forestry pests.

The Data Set

Some 3836 publications related to ICHNEUMONIDAE published between 1900 and 1990 were compiled from *Zoological Record* (The Zoological Society of London, 1900–1990), *Review of Applied Entomology, Series A: Agricultural* (CAB International Information Services, 1913–1990), and *Entomological Abstracts* (Cambridge Scientific Abstracts, 1969–1990). Some post-1990 references were also included. The taxonomic information from these publications and pre-1900 information taken from Dalla Torre (1901) were entered into a computerized data set managed by a program ('TAXA') written by myself.

The Problem

The family ICHNEUMONIDAE, with 31 709 described species-group taxa, of which 23 762 were considered biologically valid, had 61 001 names (binomina or trinomina) (Table 1). The major source of extra names was differing generic assignments, followed by synonymy and changes in subspecific combinations or status (Table 1). Replacements because of homonymy created less than 1% of the extra names. Emendations may be underestimated because they were seldom explicitly stated.

Over half of the supposedly valid taxa had more than one binomen or trinomen (Table 2). Many cases of multiple names were at least partly the result of lumping together nominal taxa, i.e. of subjective synonymy. For example *Atractodes croceicornis* Haliday, 1838 had 75 names of which 36 were junior synonyms (Jussila, 1979, p. 37).

A nomenclature system that has created 37 239 extra names (i.e. labels for the taxa) obviously needs improving. Name changes are a serious loss to the information retrieval capabilities of the present system (Raven, Berlin & Breedlove, 1971). Since scientific names are the key to storing and retrieving knowledge pertaining to the biological world, a stable nomenclature is a necessity for the advancement of our biological knowledge. The wide use of computers in information retrieval systems necessitates a nomenclature system that does not change names, even by a single letter. The present system does not fulfil this function.

In the ICHNEUMONIDAE, as in avian nomenclature (Olson, 1987) and elsewhere, the majority of the changes in names are caused by changes in generic combination. In the present system this is unavoidable. Generic changes are a result of advances in (or different interpretations of) our understanding of the relationship between living things, and as long as our taxonomic knowledge advances generic changes will follow: as pointed out by Brown (1992) 'instability of this sort is desirable'. However, the changes in *names* are certainly not desirable.

Unfortunately changes permeate down to the specific name due to the traditional (and Code regulated) need to conform with Latin grammar. For example, *Togea formosana* Uchida became *Benyllus formosanus* (Uchida) as the former generic name is feminine while the latter is masculine. In a manual literature search this minor change in ending may be unimportant, as the searcher can take such variations into account, but in a computer search *formosana* and *formosanus* will be assumed to refer to two different taxa.

The Proposal

To overcome these deficiencies it is proposed that the original binomen (generic and specific names for species, and generic and subspecific names for taxa originally treated as subspecies) be preserved in the scientific name, of which they would form the 'nomenclatural part'. The taxonomic placement of the taxon would be indicated by placing the current generic name (if different) in front of the original binomen. To this end the following rules are proposed (with deviations from the present Code in *italics*):

- (1) The nomenclatural part of the scientific name for a species-group taxon will consist of two words: the generic name and the specific (or subspecific) name given to the species (or subspecies) by the first describer. *This original binomen will be treated as an inseparable, unchangeable unit irrespective of taxonomic placement.*
 - (a) *Because the generic half of the nomenclatural binomen will not be changed, the need to change the ending of the original specific (or subspecific) name will not arise.*
 - (b) The first describer's name and the date of publication should follow the binomen. *It will not be necessary to use parentheses to enclose the describer's name and date in order to denote a change in generic combination.*
- (2) The taxonomic part of a scientific name will be constituted by the current generic name (and, where applicable, subgeneric and specific names); it forms the classificatory hierarchy of the system. The rules for the treatment of the taxonomic names will be the same as for names in the present Code.
- (3) *The full scientific name of a species-group taxon will be formed by placing the taxonomic part in front of the nomenclatural binomen.*
- (4) When the original binomen and the current name are the same, this constitutes the full name (so the generic name is not repeated).
- (5) *The full (taxonomic plus nomenclatural) name should be cited at least once in all papers, together with the original author and date; for repeated reference to a species-group taxon the original generic name may be omitted (as in the present system) if it is different from the current generic assignment.*

To demonstrate the proposed system, three scientific names of *Togea formosana*, first described by T. Uchida in 1926 and which has since been subject to two generic changes and one change in subspecific status, are illustrated in Table 3.

In the present system, determining if *Benyllus formosanus* (Uchida, 1926) and *Stirexephanes signatus formosanus* (Uchida, 1926) are actually the same taxon is not easy, because Uchida described 13 species under the same specific name, two of them in 1926. The name *formosanus* (-a, -um) is used 34 times in the ICHNEUMONIDAE (the problem is magnified further in the case of *meridionator*, which was used by J.-F. Aubert between 1959 and 1982 for 62 different 'subspecies' from southern France!). In the proposed system *Benyllus Togea formosana* and *Stirexephanes signatus Togea formosana* are obviously the same taxon, since the binomen *Togea formosana* is unique. Even errors in (or omission of) the author and date will cause little difficulty.

The proposed system will maintain a stable nomenclature in the midst of a desirably 'unstable' taxonomy, and cater to both needs (taxonomy and information

retrieval) at the same time. Only primary homonymy will affect the nomenclatural part of the name. Had this system been in place since the time of Linnaeus there would be 29 514 fewer names now (items 2, 4 and 6 in Table 1). These constitute 79% of the extra names created up to 1990 for the family ICHNEUMONIDAE; the rest are nearly all subjective synonyms due to supposedly new descriptions of (possibly) the same taxon.

The difficulty in devising a computer search strategy for a taxon with names like *Togea formosana* and *Stirexephanes signatus formosanus* is obvious. However, if we preserve the binomen *Togea formosana* in the formal name of the taxon the search will be easier. Thus the binomen, acting as a permanent identification label for the taxon, can be used as an anchor for taxonomic and biological information and the key for storing and retrieving this either manually or by computer.

At the meeting of the International Commission on Zoological Nomenclature in 1990 at the University of Maryland changes were suggested to the Code 'to provide a stable and universal nomenclature for the 21st century' (Savage, 1990). Major proposals were explicit restrictions on the reintroduction of unused senior synonyms and the eventual establishment of 'Lists of names in current use'. These suggestions would solve some problems related to name changes arising from the principle of priority, but would not solve problems arising from changes in generic combinations. As instability due to the priority of names is miniscule compared to 'instability' due to generic changes the effort to create Lists of species will solve few of the present nomenclatural difficulties. Furthermore, there may not be enough taxonomists willing to take up the task of creating the Lists. The magnitude of this task can be gauged from the fact that there are 31 709 described species and subspecies in the ichneumonid family alone, and this is only one of some 72 families in the order Hymenoptera, and Hymenoptera is only one of the 23 orders in the class Insecta (Borror, DeLong & Triplehorn, 1976). A more practical alternative to such Lists is to encourage the production of frequently updated computer-based catalogues which use an improved system of nomenclature.

From the point of view of a user (such as a biological control practitioner) the most common concerns when writing species names in publications are (1) is the generic combination that most widely accepted? (2) is the ending of the specific name correct? and (3) should the first describer's name be in parentheses? These may sound trivial to a taxonomist, but they are real problems to non-taxonomists. The present system and the suggestions made at the Maryland meeting will only perpetuate these concerns. The fourth edition of the Code is now in preparation; it is to be hoped that it will prescribe a nomenclature system that will adequately serve both the science of taxonomy and the concerns of the majority of users of scientific names.

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Table 1. *Number of species and subspecies names in the family ICHNEUMONIDAE*

(1)	Number of described valid species and subspecies	23 762	
	Extra names due to		
(2)	generic changes	26 702	
(3)	primary homonymy	333	
(4)	secondary homonymy	222	
(5)	synonymy	7364	
(6)	subspecific changes	2590	
(7)	emendations	28	
			<u>37 239</u>
			<u>61 001</u>

Table 2. *Number of names per valid species or subspecies*

Number of names per valid species or subspecies	Number of valid species and subspecies
1	10 562
2	6605
3	2600
4	1265
5	658
6	541
7	330
8	235
9	189
10	141
11 to 75	636
	<u>23 762</u>

Table 3. *Comparison of the present nomenclature system with the proposed system using the scientific names of an ichneumonid wasp first described by T. Uchida*

The Present System	The Proposed System
(1) <i>Togea formosana</i> Uchida, 1926	<i>Togea formosana</i> Uchida, 1926
(2) <i>Benyllus formosanus</i> (Uchida, 1926)	<i>Benyllus Togea formosana</i> Uchida, 1926
(3) <i>Stirexephanes signatus formosanus</i> (Uchida, 1926)	<i>Stirexephanes signatus Togea formosana</i> Uchida, 1926

In the proposed system the unchanging binomen *Togea formosana* constitutes the nomenclatural part of the full scientific name. This system, unlike the present one, unambiguously distinguishes the taxon from *Ctenichneumon formosanus* Uchida, 1926 (= *Setana formosana* (Uchida, 1926)).

Sources: (1) Uchida, 1926, p. 112. (2) Uchida, 1935, p. 18. (3) Townes, Townes & Gupta, 1961, p. 348.

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